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CLAIMS

1. A non-aqueous, oil-continuous microemulsion comprising:
at least one oil component;
at least one non-aqueous polar solvent component;
10 at least one amphiphilic material component; and
at least one solubilized polar compound component.
2. The microemulsion of claim 1 wherein said oil component is selected from
alkyl esters of fatty acids, fatty alcohols, esters of dicarboxylic acids, guerbet
15 alcohols, alcohol acetates, petroleum fractions, aliphatic paraffinic light distillates,
hydrocarbon oils, vegetable oils, synthetic triglycerides, triethyl phosphate, and
combinations thereof.
3. The microemulsion of claim 2 wherein said esters of dicarboxylic acids are
20 selected from abietic acid, azelaic acid, fumaric acid, phthalic acid, adipic acid,
malonic acid, oxalic acid, succinic acid, carbonic acid, and combinations thereof.
4. The microemulsion of claim 2 wherein said alkyl esters of fatty acids are
selected from methyl oleate, ethyl oleate, methyl soyate, ethyl soyate, soybean oil,
25 castor oil, and combinations thereof.
5. The microemulsion of claim 2 wherein said hydrocarbon oils are selected
from an aliphatic hydrocarbon, an aromatic hydrocarbon, and combinations
thereof.
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6. The microemulsion of claim 1 wherein said oil component comprises a
branched-chain hydrocarbon having between about 12 and about 20 carbon
atoms.

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7. The microemulsion of claim 1 wherein said non-aqueous, polar solvent is selected from an alcohol, a low-molecular-weight ester, an amine, an alkoxylated amine, an amide, a nitrile, a sulfoxide, sorbitol, urea, and combinations thereof.

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8. The microemulsion of claim 1 wherein said non-aqueous, polar solvent comprises an alcohol having more than one hydroxyl group selected from a dihydric alcohol, a trihydric alcohol, a polyhydric alcohol (polyol), and combinations thereof.

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9. The microemulsion of claim 8 wherein said dihydric alcohol is selected from ethylene glycol, propylene glycol, 1,3-butanediol, a glycol derivative, and combinations thereof.

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10. The microemulsion of claim 8 wherein said trihydric alcohol is a glycerol or a glycerol derivative.

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11. The microemulsion of claim 8 wherein said polyhydric alcohol (polyol) comprises the formula $\text{CH}_2\text{OH}(\text{CHOH})_n\text{CH}_2\text{OH}$, and wherein n is between 2 and 5.

12. The microemulsion of claim 7 wherein said amine is selected from ethylene diamine, ethanolamine, diethanolamine, triethanolamine, and combinations thereof.

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13. The microemulsion of claim 7 wherein said amide is selected from dimethylformamide, dimethylacetamide, N-methylpyrrolidone, and combinations thereof.

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- 5 14. The microemulsion of claim 7 wherein said sulfoxide is dimethylsulfoxide.
15. The microemulsion of claim 7 wherein said low-molecular-weight ester is γ -butyrolactone.
- 10 16. The microemulsion of claim 7 wherein said nitrile is benzonitrile.
17. The microemulsion of claim 1 wherein said amphiphilic material is selected from cationic surfactants, non-ionic surfactants, quaternary surfactants, amphoteric surfactants, zwitterionic surfactants, and combinations thereof.
- 15 18. The microemulsion of claim 17 wherein said cationic surfactant is selected from an alkylamine having between 8 and 18 carbon atoms, an alkoxylated amine having between 8 and 18 carbon atoms, and combinations thereof.
- 20 19. The microemulsion of claim 17 wherein said non-ionic surfactant is selected from a polyoxyethylene alcohol, an alcohol polyoxypropylene-polyoxyethylene, a polyoxyethylene sorbitan fatty acid ester, an acetylenic diol, an ethoxylated acetylenic diol, and combinations thereof.
- 25 20. The microemulsion of claim 1 wherein said amphiphilic material is selected from alkylamines, alkylamine ethoxylates, alkylamine propoxylates, alkylamine propoxylate-ethoxylates, fatty alcohol ethoxylates, fatty alcohol propoxylates, fatty alcohol propoxylate-ethoxylates, fatty acid ethoxylates, fatty acid propoxylates, fatty acid propoxylate-ethoxylates, synthetic long-chain alcohol ethoxylates, synthetic long-chain alcohol propoxylates, synthetic long chain acid propoxylate-ethoxylates, synthetic long-chain acid ethoxylates, synthetic long-chain acid propoxylates, synthetic long chain acid propoxylate-ethoxylates, alkylphenol ethoxylates, alkylphenol propoxylates, alkylphenol propoxylate-ethoxylates,
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- 5 alkylpolyglucosides, sorbitol esters, sorbitan esters, sorbitol ester ethoxylates, sorbitan ester ethoxylates, polyoxypropylene-polyoxyethylene block copolymers, ethylenediamine-polyoxypropylene-polyoxyethylene block copolymers, and combinations thereof.
- 10 21. The microemulsion of claim 1 wherein said solubilized polar compound is a polar agrochemical complex.
22. The microemulsion of claim 21 wherein said polar agrochemical complex is a polar-acidic agrochemical complex is selected from an amino acid, a phenoxy, and combinations thereof.
- 15 23. The microemulsion of claim 22 wherein said polar-acidic agrochemical complex is selected from a glyphosate complex, a 2,4-D complex, a glufosinate complex, and combinations thereof.
- 20 24. The microemulsion of claim 23 wherein said glyphosate complex is selected from a glyphosate ester, a glyphosate amide, a glyphosate alkylamide, a glyphosate salt, and combinations thereof.
- 25 25. The microemulsion of claim 23 wherein said glyphosate complex comprises a glyphosate ester and an alcohol.
26. The microemulsion of claim 23 wherein said glyphosate complex comprises a glyphosate alkylamide and an amine.
- 30 27. The microemulsion of claim 1 wherein the equivalent acid content of solubilized polar compound present in said microemulsion is between less than about 5 and about 20% by weight.

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28. A method of making a non-aqueous, oil-continuous microemulsion containing a solubilized polar compound comprising:

providing a non-aqueous polar portion comprising said polar compound solubilized in a non-aqueous, polar solvent;

10 providing an amphiphilic material and mixing said amphiphilic material with said non-aqueous polar portion to produce an intermediate mixture; and

providing an oil component and mixing said oil component with said intermediate mixture to produce said non-aqueous, oil-continuous microemulsion.

15 29. The method of claim 28 further comprising heating said amphiphilic material with said non-aqueous polar portion.

30. The method of claim 28 wherein said polar compound comprises a polar-acidic agrochemical complex.

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31. The method of claim 28 wherein said amphiphilic material comprises a cationic surfactant.

25 32. The method of claim 31 wherein said cationic surfactant comprises an alkylamine surfactant or an alkoxylated amine surfactant.

33. The method of claim 28 wherein said non-aqueous polar portion is prepared by:

providing said non-aqueous, polar solvent;

30 providing an insoluble, solid polar compound and combining said polar compound with said non-aqueous, polar solvent to form a reaction mixture; and

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- 5 providing a compound having an amine, sulfonium, sulfoxonium, amide or ester functional group and mixing said compound with said reaction mixture to form a soluble salt, amide, or ester of said polar compound.
34. The method of claim 33 further comprising heating said compound with
10 said reaction mixture.
35. The method of claim 33 wherein said soluble salt of said polar compound is selected from diamine salts, polyamine salts, primary amine salts, secondary amine salts, tertiary amine salts, ammonium and quaternary ammonium salts,
15 hydroxylamine salts, ammonium salts, long-chain alkylamine salts, sulfonium salts, sulfoxonium salts, and combinations thereof.
36. The method of claim 28 further comprising providing a second amphiphilic material and mixing said second amphiphilic material with said intermediate
20 mixture to produce said non-aqueous, oil-continuous microemulsion.
37. The method of claim 36 wherein said second amphiphilic material comprises a non-ionic surfactant.
- 25 38. A post-emergence herbicidal spray composition comprising a non-aqueous, oil-continuous microemulsion, said microemulsion comprising:
at least one oil component;
at least one non-aqueous polar solvent component;
at least one amphiphilic material component; and
30 at least one solubilized polar compound component.
39. The post-emergence herbicidal spray composition of claim 38 wherein said oil component comprises methyl oleate.

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40. The post-emergence herbicidal spray composition of claim 38 wherein said solubilized polar compound component comprises a polar-acidic agrochemical complex selected from a glyphosate complex, a 2,4-D complex, a glufosinate complex, and combinations thereof.

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41. The post-emergence herbicidal spray composition of claim 38 wherein said microemulsion is characterized by an octanol/water partitioning coefficient of between about 2 and about 4 k_{ow} .

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42. The post-emergence herbicidal spray composition of claim 38 wherein said microemulsion is characterized by a pH of less than 7.00 at about 22°C.

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43. A method of controlling weeds which comprises applying a post-emergence herbicidal spray composition to a target plant, said composition comprising a non-aqueous, oil-continuous microemulsion comprising:

at least one oil component;

at least one non-aqueous polar solvent component;

at least one amphiphilic material component; and

at least one solubilized polar compound component that comprises a polar-acidic agrochemical complex selected from a glyphosate complex, a 2,4-D complex, a glufosinate complex, and combinations thereof.

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44. The method of claim 43 wherein said applying a post-emergence herbicidal spray composition to a target plant is performed by either conventional mechanical, non-electrostatic or by electrostatic low-volume or ultra-low volume techniques.

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- 5 45. A method of improving the uptake and translocation of a systemic herbicidal compound in a target plant which comprises applying a post-emergence herbicidal spray composition to said target plant, said composition comprising a non-aqueous, oil-continuous microemulsion comprising:
- 10 at least one oil component;
at least one non-aqueous polar solvent component;
at least one amphiphilic material component; and
at least one solubilized polar compound component that comprises a polar-acidic agrochemical complex selected from a glyphosate complex, a 2,4-D complex, a glufosinate complex, and combinations thereof, wherein
- 15 said oil component affects said improved uptake and translocation of said solubilized polar compound in said target plant.
46. A method of improving the uptake and translocation of a systemic insecticidal or fungicidal compound in a target plant which comprises applying an
- 20 insecticidal or fungicidal spray composition to said target plant, said composition comprising a non-aqueous, oil-continuous microemulsion comprising:
- at least one oil component;
at least one non-aqueous polar solvent component;
at least one amphiphilic material component; and
- 25 at least one solubilized polar compound component that comprises a polar-acidic agrochemical complex, wherein
- said oil component affects said improved uptake and translocation of said solubilized polar compound in said target plant.
- 30 47. The method of claim 45 or 46 wherein said oil component comprises methyl oleate.

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- 5 48. A method of controlling weeds which comprises applying a post-emergence herbicidal spray composition to a target plant, wherein
said composition comprises a non-aqueous, oil-continuous microemulsion,
and
said applying a post-emergence herbicidal spray composition to a target
10 plant is performed by either conventional mechanical, non-electrostatic or by electrostatic low-volume or ultra-low volume techniques, which deliver a droplet size of between about 5 and about 30 microns to said target plant.
- 15 49. A method of controlling insects or fungi which comprises applying an insecticidal or fungicidal spray composition to a target plant, wherein
said composition comprises a non-aqueous, oil-continuous microemulsion,
and
said applying an insecticidal or fungicidal spray composition to a target
plant is performed by either conventional mechanical, non-electrostatic or by
20 electrostatic low-volume or ultra-low volume techniques, which deliver a droplet size of between about 5 and about 30 microns to said target plant.
- 25 50. A method of controlling weeds which comprises applying a post-emergence herbicidal spray composition to a target plant, wherein
said composition comprises a non-aqueous, oil-continuous microemulsion,
and
said applying a post-emergence herbicidal spray composition to a target
plant is performed by either conventional mechanical, non-electrostatic or by
electrostatic techniques, which deliver a volume of formulated product to said
30 target plant, at a volume rate that is less than about 500 lts/ha.

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